

**CREW ENGINEERING
AND SURVEYING**
5725 KEARNY VILLA ROAD, SUITE D
SAN DIEGO, CALIFORNIA 92123
(858) 571-0555

**Preliminary Drainage Study for
Oakmont II,
TM 5421/ER 05-14-003**

Introduction

The subject property is approximately 103 acres located North of Old Highway 80, West of Flinn Springs Road and South and East of Oak Creek Road in the County of San Diego, Latitude 32°51' North, Longitude 116°50' West. The project is a subdivision with 20 proposed estate residential lots.

This study is to analyze the runoff from and through the site and the facilities that have been designed to safely convey drainage to the existing watercourses.



**ENGINEER OF WORK:
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Ronald C Ashman 3/09

**RONALD C. ASHMAN, R.C.E. 34300
EXPIRES SEPTEMBER 30, 2009**

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January 10, 2005
Revised March 25, 2009

County of San Diego
Department of Public Works
5201 Ruffin Road, Suite. B
San Diego, Ca. 92123

Attn.: Ed Sinsay, Project Manager

Ref.: Preliminary Drainage Study for Oakmont II, TM 5421/ER 05-14-003 (J.N. 450)

Dear Ed:

This letter is to serve as a drainage study for the above referenced tentative map application. The site is approximately 103.0 acres located North of Old Highway 80, West of Flinn Springs Road, and South and East of Oak Creek Road in the County of San Diego, Latitude 32°51' North, Longitude 116°50' West. The Property is currently undeveloped and surrounded by single family residence land uses. There is also an Elementary School to the Southeast of the project site.

The existing site is characterized by a hill that dominates the Southwestern third of the property. A saddle separates this hill from a ridge East of the summit. The ridge runs through the center of the property, continues offsite, and then reenters the property by the elementary school and proceeds through the Northeastern portion of the property.

A plot of the property boundary and drainage basins on the County 1"=200' topographic plat is attached for your information. The most Northerly of the exit points (pt. D) has a contributing area of approximately 6.1 acres and exits the property into an existing 24" stormdrain pipe under Oak Creek Road. The next exit point is along the Westerly property boundary approximately 1200' south of Oak Creek Road. It is an existing drainage course running Southwest as it exits the property (pt. C) and has a drainage area of approximately 21.8 acres. Another existing drainage course exits the property about 1000' South of pt C (pt. B) and drains approximately 5.3 acres. The last exit point is an existing stormdrain pipe at the corner of Flinn Springs Road and Old Highway 80. Runoff exits the site through various minor water courses and is conveyed via a roadside ditch to an existing 24" CMP under Old Highway 80. The runoff developed by the remaining areas of the project not defined within any of the above described drainage areas are conveyed offsite via overland flow and not through any well defined drainage courses.

The drainage areas were analyzed using the Rational Method ($Q=CIA$). The 100 Year Return Frequency was used for sizing of proposed pipes and checking capacity of existing pipes and ditches. The Soils Group Maps show primarily Group C soils within the drainage areas. Runoff Coefficient = 0.36 for Soil Group C, Rural Residential Land Use. The equation from the Nomograph for Determination of Time of Concentration (Fig. 3-3) for Natural Watersheds was used to determine travel time (T_t), and Maximum Overland Flow Length & Initial Time of Concentration (T. 3-2) was used to determine the initial time of concentration (T_i); $T_c = T_i + T_t$. Intensity calculation: 100 Yr. $P_6 = 3.0"$ $P_{24} = 6.4"$ $P_6 / P_{24} = 0.47$; so no adjustment is

required. $I = 7.44 \times P^6 \times D^{-0.645}$ where $D = T_c$. Manning's Equation was used for pipe and ditch capacity checks.

Basin A $T_c = 17.3$ min. $Q_{100} = CIA = 0.36 \times 3.9 \times 16.7 = 21.3$ cfs

Basin B $T_c = 10.4$ min. $Q_{100} = CIA = 0.36 \times 5.6 \times 5.3 = 9.4$ cfs

Basin C $T_c = 13.4$ min. $Q_{100} = CIA = 0.36 \times 4.6 \times 21.8 = 32.8$ cfs;

Basin C1 $T_c = 10.6$ min. $Q_{100} = CIA = 0.36 \times 5.5 \times 1.8 = 3.2$ cfs

Basin D $T_c = 11.2$ min. $Q_{100} = CIA = 0.36 \times 5.3 \times 6.1 = 10.3$ cfs;

Basin A 21.3 cfs should drain Southerly via overland flow and collect into a road side ditch along Old Highway 80 there it be conveyed to point A and then through an existing 24" CMP under Old Highway 80.

Basin B 9.4 cfs should drain Northwesterly to a natural swale where it exits the property at point B.

Basin C1 3.2 cfs drains into a natural drainage swale to point E there it flows through the proposed 18" CMP under the cul-de-sac of the "to be named" private street. Then into a rip rap energy dissipation device and back into the natural drainage swale.

Basin C 32.8 cfs drains Northwesterly via overland flow and a series of minor drainage gullies to a natural drainage swale to point C where it exits the property.

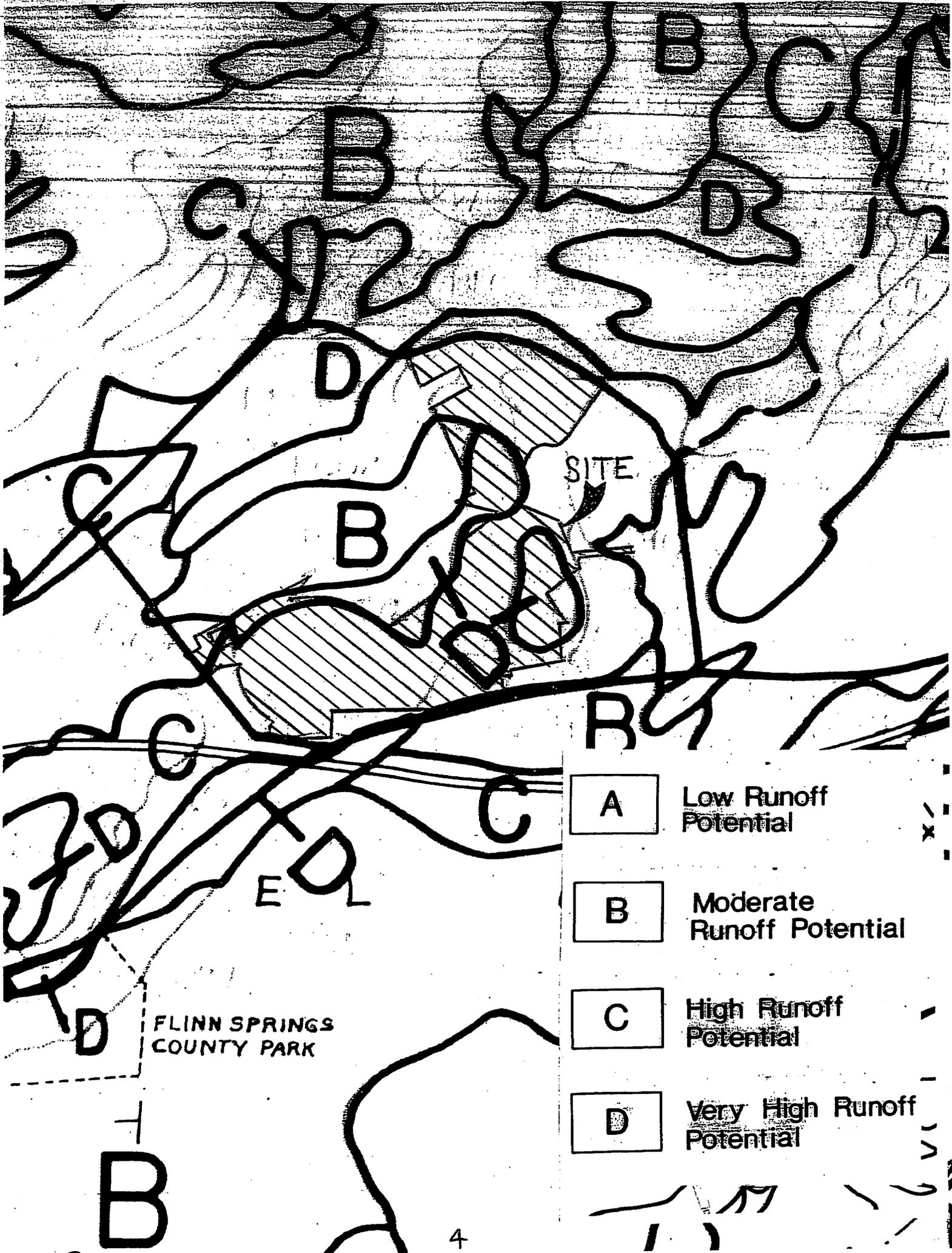
Basin D 10.3 cfs drains Northeasterly via overland flow to point D then through an existing 24" CMP under Oak Creek Road and into a 2' PCC brow ditch.

The proposed subdivision design respects the natural drainage patterns and no diversion results from the proposed project. The project design includes rip rap energy dissipation devices at the points where water is taken off the proposed private streets. It also includes a 24" pipe under the cul-de-sac of the proposed extension of Oakmont Terrace with rip rap at the outlet. It is anticipated that the existing stormdrain pipes will be maintained by the county as they are public facilities.

Should you need any additional information or detail please contact me directly at my office number listed above.

Respectfully Submitted,
Crew Engineering and Surveying

Ronald C. Ashman
Civil Engineer/ Land Surveyor



A

Low Runoff Potential

B

Moderate Runoff Potential

C

High Runoff Potential

D

Very High Runoff Potential

FLINN SPRINGS COUNTY PARK

SITE

Table 3-1
RUNOFF COEFFICIENTS FOR URBAN AREAS

Land Use	Runoff Coefficient "C"	Soil Type				
		A	B	C	D	
NRCS Elements						
Undisturbed Natural Terrain (Natural)	Permanent Open Space	0*	0.20	0.25	0.30	0.35
Low Density Residential (LDR)	Residential, 1.0 DU/A or less	10	0.27	0.32	0.36	0.41
Low Density Residential (LDR)	Residential, 2.0 DU/A or less	20	0.34	0.38	0.42	0.46
Low Density Residential (LDR)	Residential, 2.9 DU/A or less	25	0.38	0.41	0.45	0.49
Medium Density Residential (MDR)	Residential, 4.3 DU/A or less	30	0.41	0.45	0.48	0.52
Medium Density Residential (MDR)	Residential, 7.3 DU/A or less	40	0.48	0.51	0.54	0.57
Medium Density Residential (MDR)	Residential, 10.9 DU/A or less	45	0.52	0.54	0.57	0.60
Medium Density Residential (MDR)	Residential, 14.5 DU/A or less	50	0.55	0.58	0.60	0.63
High Density Residential (HDR)	Residential, 24.0 DU/A or less	65	0.66	0.67	0.69	0.71
High Density Residential (HDR)	Residential, 43.0 DU/A or less	80	0.76	0.77	0.78	0.79
Commercial/Industrial (N. Com)	Neighborhood Commercial	80	0.76	0.77	0.78	0.79
Commercial/Industrial (G. Com)	General Commercial	85	0.80	0.80	0.81	0.82
Commercial/Industrial (O.P. Com)	Office Professional/Commercial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (Limited I.)	Limited Industrial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (General I.)	General Industrial	95	0.87	0.87	0.87	0.87

*The values associated with 0% impervious may be used for direct calculation of the runoff coefficient as described in Section 3.1.2 (representing the pervious runoff coefficient, Cp, for the soil type), or for areas that will remain undisturbed in perpetuity. Justification must be given that the area will remain natural forever (e.g., the area is located in Cleveland National Forest).

DU/A = dwelling units per acre

NRCS = National Resources Conservation Service

Note that the Initial Time of Concentration should be reflective of the general land-use at the upstream end of a drainage basin. A single lot with an area of two or less acres does not have a significant effect where the drainage basin area is 20 to 600 acres.

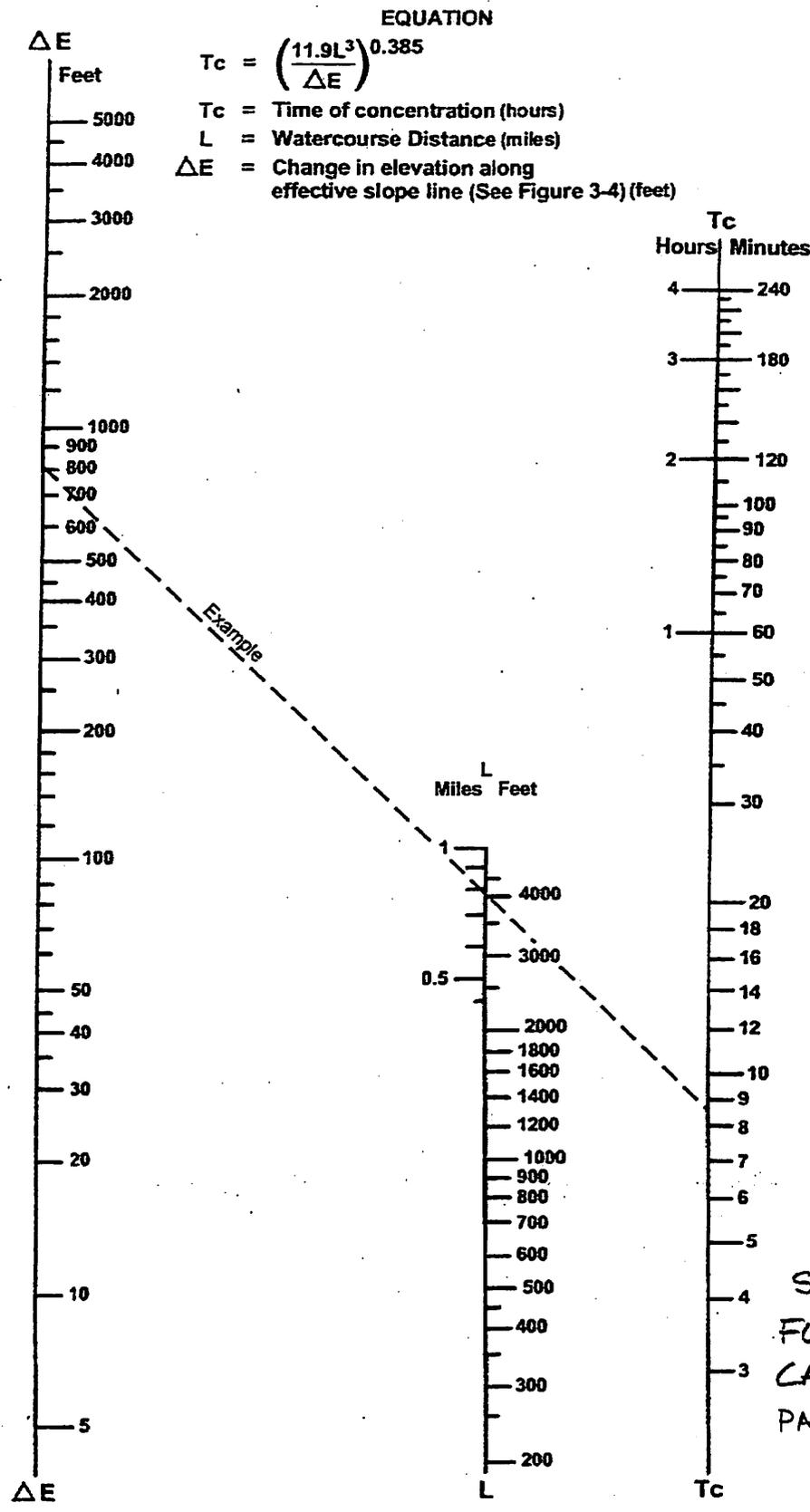
Table 3-2 provides limits of the length (Maximum Length (L_M)) of sheet flow to be used in hydrology studies. Initial T_i values based on average C values for the Land Use Element are also included. These values can be used in planning and design applications as described below. Exceptions may be approved by the "Regulating Agency" when submitted with a detailed study.

Table 3-2

**MAXIMUM OVERLAND FLOW LENGTH (L_M)
& INITIAL TIME OF CONCENTRATION (T_i)**

Element*	DU/ Acre	.5%		1%		2%		3%		5%		10%	
		L_M	T_i										
Natural		50	13.2	70	12.5	85	10.9	100	10.3	100	8.7	100	6.9
LDR	1	50	12.2	70	11.5	85	10.0	100	9.5	100	8.0	100	6.4
LDR	2	50	11.3	70	10.5	85	9.2	100	8.8	100	7.4	100	5.8
LDR	2.9	50	10.7	70	10.0	85	8.8	95	8.1	100	7.0	100	5.6
MDR	4.3	50	10.2	70	9.6	80	8.1	95	7.8	100	6.7	100	5.3
MDR	7.3	50	9.2	65	8.4	80	7.4	95	7.0	100	6.0	100	4.8
MDR	10.9	50	8.7	65	7.9	80	6.9	90	6.4	100	5.7	100	4.5
MDR	14.5	50	8.2	65	7.4	80	6.5	90	6.0	100	5.4	100	4.3
HDR	24	50	6.7	65	6.1	75	5.1	90	4.9	95	4.3	100	3.5
HDR	43	50	5.3	65	4.7	75	4.0	85	3.8	95	3.4	100	2.7
N. Com		50	5.3	60	4.5	75	4.0	85	3.8	95	3.4	100	2.7
G. Com		50	4.7	60	4.1	75	3.6	85	3.4	90	2.9	100	2.4
O.P./Com		50	4.2	60	3.7	70	3.1	80	2.9	90	2.6	100	2.2
Limited I.		50	4.2	60	3.7	70	3.1	80	2.9	90	2.6	100	2.2
General I.		50	3.7	60	3.2	70	2.7	80	2.6	90	2.3	100	1.9

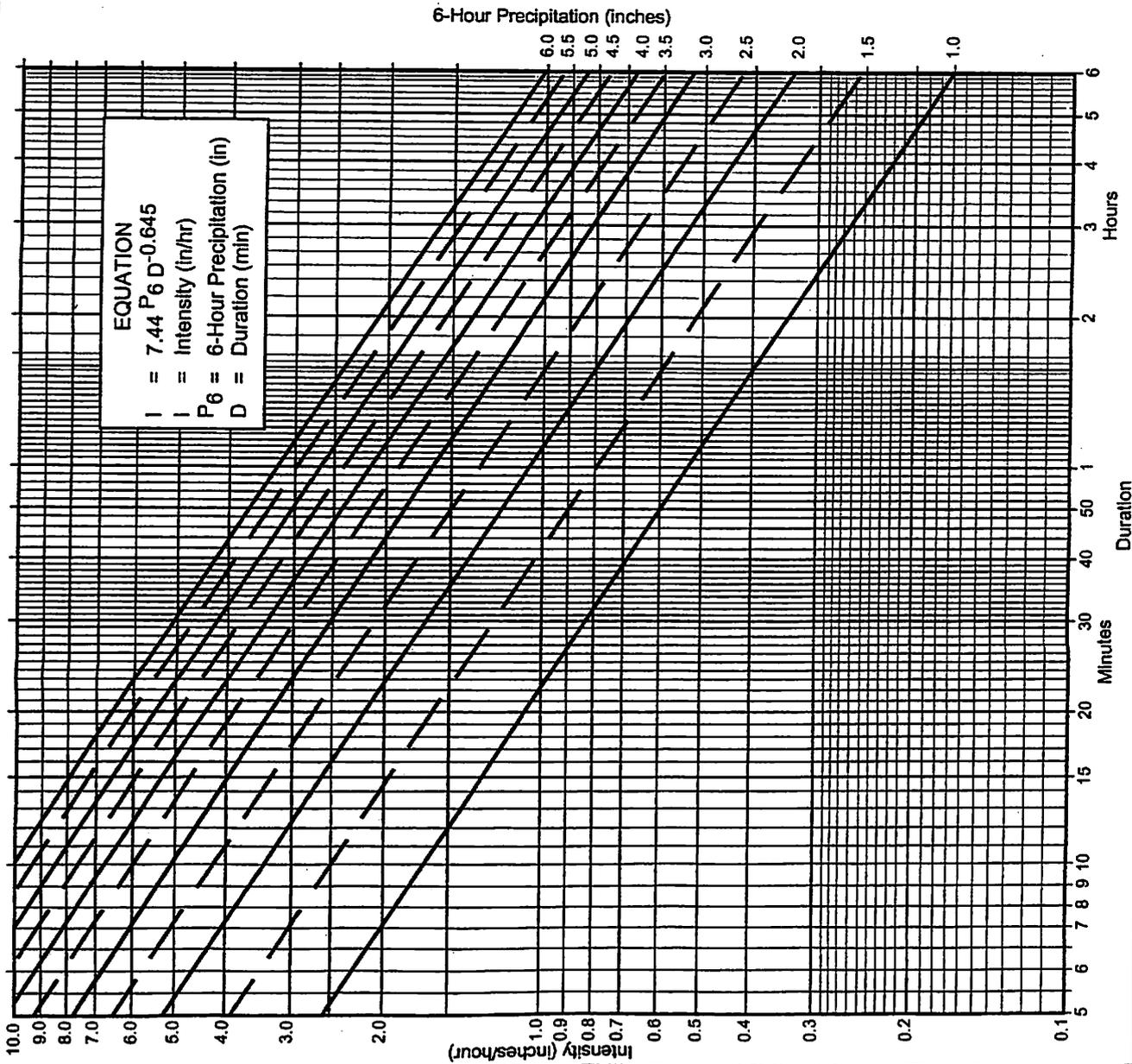
*See Table 3-1 for more detailed description



SOURCE: California Division of Highways (1941) and Kirpich (1940)

**Nomograph for Determination of
Time of Concentration (T_c) for Natural Watersheds**

**FIGURE
3-3**



Directions for Application:

- (1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).
- (2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicable to Desert).
- (3) Plot 6 hr precipitation on the right side of the chart.
- (4) Draw a line through the point parallel to the plotted lines.
- (5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency 100 year

(b) $P_6 = \underline{2.0}$ in., $P_{24} = \underline{6.4}$, $\frac{P_6}{P_{24}} = \underline{47}$ %⁽²⁾

(c) Adjusted $P_6^{(2)} = \underline{0}$ in.

(d) $t_x = \underline{\hspace{2cm}}$ min. SEE TABLE FOR

(e) $I = \underline{\hspace{2cm}}$ in./hr. INTENSITY CALCULATION PAGE

Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

P6	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Duration	1	1	1	1	1	1	1	1	1	1	1
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.60	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.68	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.46	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.99	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
80	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.16	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

Basin A

Overland Flow

Dist. (mi.)	Elev. Diff.	C	Ti	Tt	Tc
0.534090909	280	0.36	8.70	8.6	17.30

Intensity

P6 (100 yr.) 3	Tc 17.3	I (100 yr) 3.5			
C 0.36	I (100 yr) 3.5	A 16.7			Q100 21.3

Basin B

Overland Flow

Dist. (mi.)	Elev. Diff.	C	Ti	Tt	Tc
0.09280303	100	0.36	8.70	1.7	10.40

Intensity

P6 (100 yr.) 3	Tc 10.4	I (100 yr) 4.9			
C 0.36	I (100 yr) 4.9	A 5.3			Q100 9.4

Basin C

Overland Flow

Dist. (mi.)	Elev. Diff.	C	Ti	Tt	Tc
0.270833333	180	0.36	8.70	4.7	13.40

Intensity

P6 (100 yr.) 3	Tc 13.4	I (100 yr) 4.2			
C 0.36	I (100 yr) 4.2	A 21.8			Q100 32.8

Basin C1

Overland Flow

Dist. (mi.)	Elev. Diff.	C	Ti	Tt	Tc
0.090909091	70	0.36	8.70	1.9	10.60

Intensity

P6 (100 yr.) 3	Tc 10.6	I (100 yr) 4.9			
C 0.36	I (100 yr) 4.9	A 1.8			Q100 3.2

Basin D

Overland Flow

Dist. (mi.)	Elev. Diff.	C	Ti	Tt	Tc
0.123106061	81	0.36	8.7	2.5	11.20

Intensity

P6 (100 yr.)	Tc	I (100 yr)	
3	11.2	4.7	
C	I (100 yr)	A	Q100
0.36	4.7	6.1	10.3

Summary Table

BASIN	PRE	POST
A	21.3	21.3
B	9.4	9.4
C	32.8	32.8
C1	3.2	3.2
D	10.3	10.3

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: 450

Comment: 24" CMP at Flinn Springs and Hwy 80, PT. A

Solve For Actual Depth

Given Input Data:

Diameter.....	2.00 ft
Slope.....	0.0300 ft/ft
Manning's n.....	0.024
Discharge.....	21.30 cfs

Computed Results:

Depth.....	1.65 ft
Velocity.....	7.70 fps
Flow Area.....	2.77 sf
Critical Depth....	1.65 ft
Critical Slope....	0.0298 ft/ft
Percent Full.....	82.29 %
Full Capacity.....	21.22 cfs
QMAX @.94D.....	22.83 cfs
Froude Number.....	1.01 (flow is Supercritical)

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: 450

Comment: 24" CMP at Oak Creek Road, PT. D

Solve For Actual Depth

Given Input Data:

Diameter.....	2.00 ft
Slope.....	0.0200 ft/ft
Manning's n.....	0.024
Discharge.....	10.30 cfs

Computed Results:

Depth.....	1.11 ft
Velocity.....	5.75 fps
Flow Area.....	1.79 sf
Critical Depth....	1.15 ft
Critical Slope....	0.0179 ft/ft
Percent Full.....	55.50 %
Full Capacity.....	17.33 cfs
QMAX @.94D.....	18.64 cfs
Froude Number.....	1.07 (flow is Supercritical)

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: 450

Comment: Proposed 18" CMP at cul-de-sac, PT E

Solve For Actual Depth

Given Input Data:

Diameter.....	1.50 ft
Slope.....	0.0200 ft/ft
Manning's n.....	0.024
Discharge.....	3.20 cfs

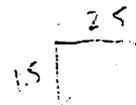
Computed Results:

Depth.....	0.66 ft
Velocity.....	4.29 fps
Flow Area.....	0.75 sf
Critical Depth....	0.68 ft
Critical Slope....	0.0176 ft/ft
Percent Full.....	43.84 %
Full Capacity.....	8.05 cfs
QMAX @.94D.....	8.66 cfs
Froude Number.....	1.07 (flow is Supercritical)

Average Values of Roughness Coefficient (Manning's n)

<u>Type of Waterway</u>	<u>Roughness Coefficient (n)</u>
1. Closed Conduits (1)	
SPIRAL RIB	0.011
Steel (not lined)	0.015
Cast Iron	0.015
Aluminum	.021
Corrugated Metal (not lined)	0.024 ← USED IN FLOW ANALYSIS
Corrugated Metal (2) (smooth asphalt quarterlining)	0.021
Corrugated Metal (2) (smooth asphalt half lining)	0.018
Corrugated Metal (smooth asphalt full lining)	0.012 →
Concrete RCP	0.012
Clay (sewer)	0.013
Asbestos Cement	0.011
Drain Tile (terra cotta)	0.015
Cast-in-place Pipe	0.015
Reinforced Concrete Box	0.014
PVC	0.009
2. Open Channels (1)	
a. Unlined	
Clay Loam	0.023
Sand	0.020
b. Revetted	
Gravel	0.030
Rock	0.040
Pipe and Wire	0.025
Sacked Concrete	0.025
c. Lined	
Concrete (poured)	0.014
Air Blown Mortar (3)	0.016
Asphaltic Concrete or Bituminous Plant Mix	0.018
d. Vegetated (5)	
Grass lined, maintained	.035
Grass and Weeds	.045
Grass lined with concrete low flow channel	.032
3. Pavement and Gutters (1)	
Concrete	0.015
Bituminous (plant-mixed)	0.016

$$R = \frac{A}{WP}$$



<u>Type of Waterway</u>	<u>Roughness Coefficient (n)</u>
4. Depressed Medians (10:1 slopes)(1)	
Earth (without growth)	0.040
Earth (with growth)	0.050
Gravel	0.055
5. Natural Streams(4)	
a. Minor streams (surface width at flood stage < 100 ft)	
(1) Fairly regular section	
(a) Some grass and weeds, little or no brush	0.030 ←
(b) Dense growth of weeds, depth of flow materially greater than weed height	0.040
(c) Some weeds, light brush on banks	0.040
(d) Some weeds, heavy brush on banks	0.060
(e) For trees within channel with branches submerged at high stage, increase all above values by 0.015	
(2) Irregular section, with pools, slight channel meander	
Channels (a) to (e) above, increase all values by 0.015	
(3) Mountain streams; no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stage	
(a) Bottom, gravel, cobbles and few boulders	0.050
(b) Bottom, cobbles with large boulders	0.060
b. Flood plains (adjacent to natural streams)	
(1) Pasture, no brush	
(a) Short grass	0.030
(b) High grass	0.040
(2) Cultivated areas	
(a) No crop	0.040
(b) Mature row crops	0.040
(c) Mature field crops	0.050
(3) Heavy weeds, scattered brush	0.050
(4) Light brush and trees	0.060
(5) Medium to dense brush	0.090
(6) Dense willows	0.170
(7) Cleared land with tree stumps, 100-150 per acre	0.060
(8) Heavy stand of timber, little undergrowth	
(a) Flood depth below branches	0.110
(b) Flood depth reaches branches	0.140

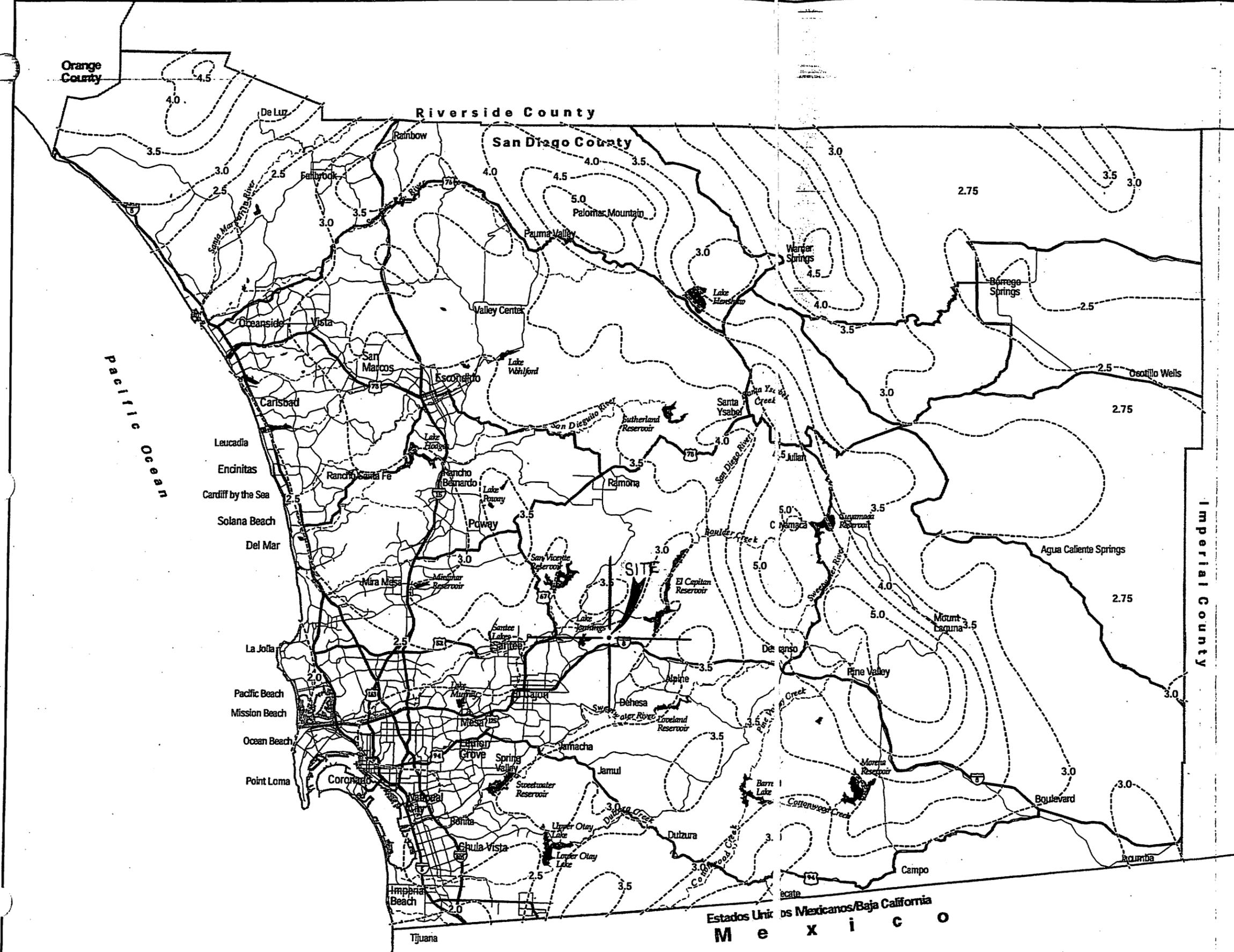
County of San Diego Hydrology Manual



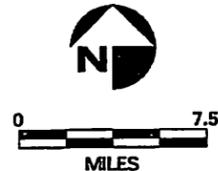
Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

Isopluvial (inches)



Map Notes
 Stateplane Projection, Zone6, NAD83
 Creation Date: June 22, 2001
 NOT TO BE USED FOR DESIGN CALCULATIONS



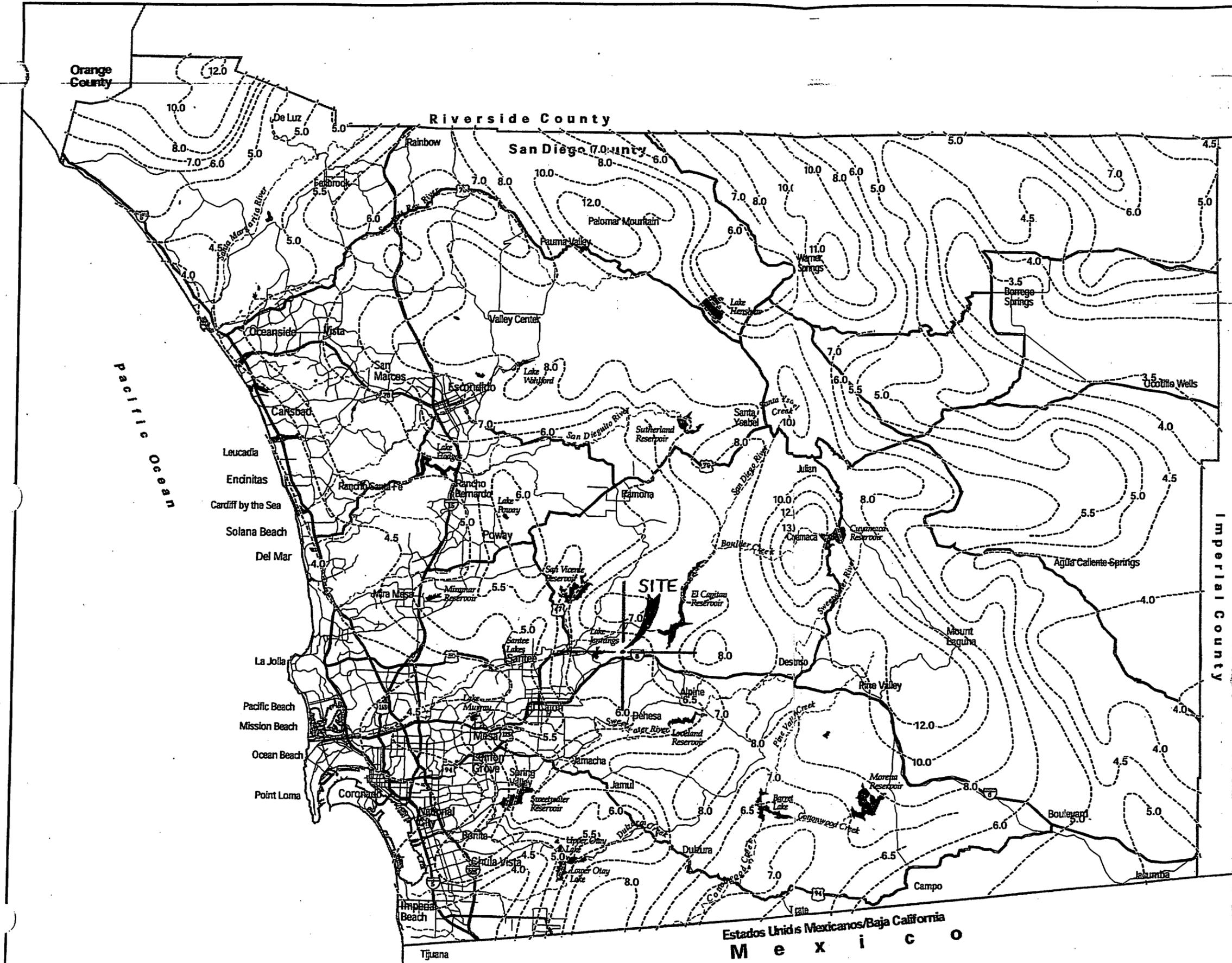
County of San Diego Hydrology Manual



Rainfall Isopluvials

100 Year Rainfall Event - 24 Hours

Isopluvial (inches)

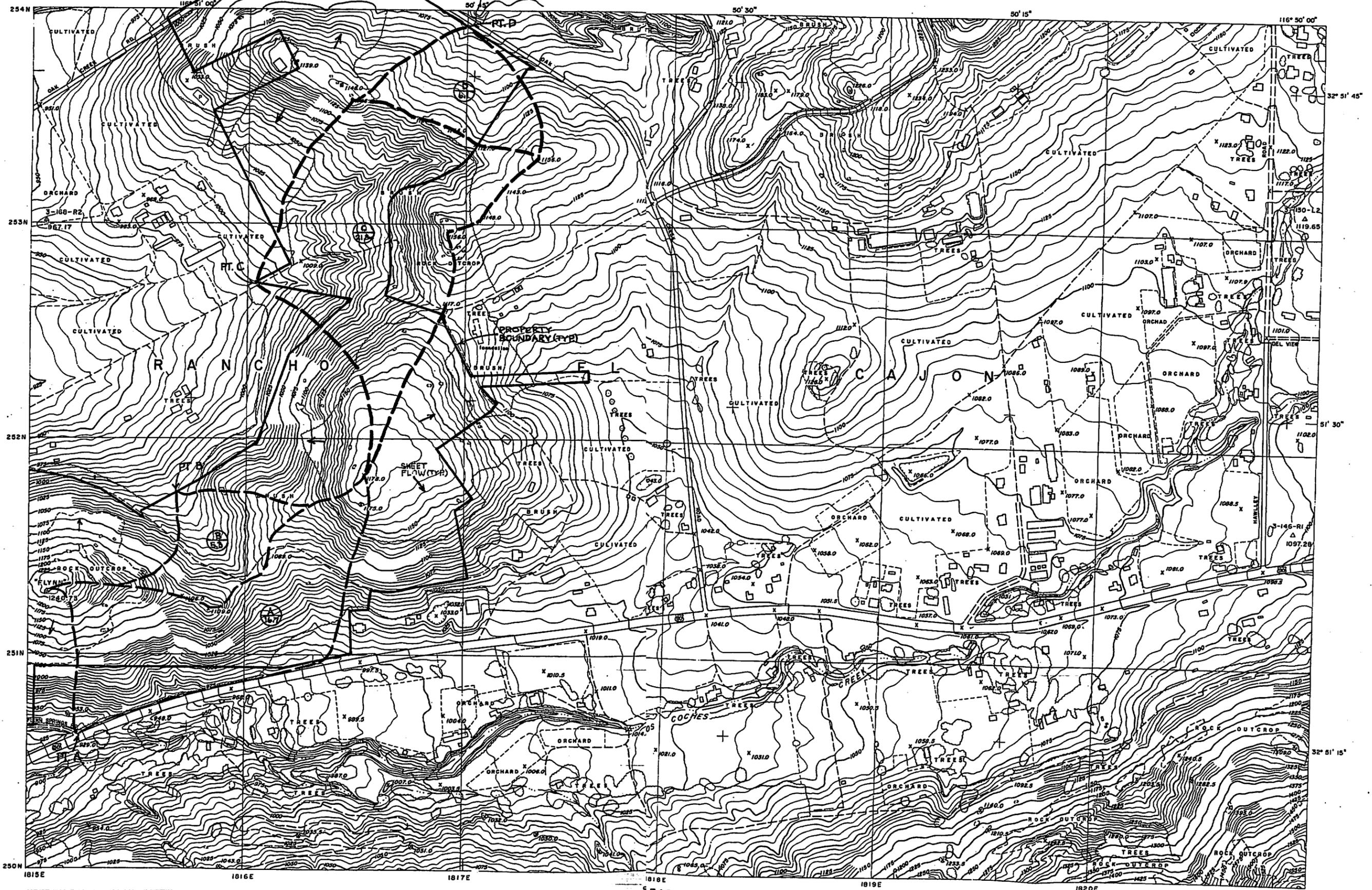


Map Notes

Stateplane Projection, Zone6, NAD83
 Creation Date: June 22, 2001
 NOT TO BE USED FOR DESIGN CALCULATIONS



COUNTY OF SAN DIEGO
TOPOGRAPHIC SURVEY



PREPARED UNDER THE DIRECTION OF THE COUNTY SURVEYOR
OF THE COUNTY OF SAN DIEGO, CALIFORNIA.
CONTROL BY U.S.C. & G.S., U.S.G.S. AND THE COUNTY OF SAN DIEGO,
NORTH AMERICAN DATUM 1927.

COMPILED BY PHOTOGRAMMETRIC METHODS
FROM PHOTOGRAPHY DATED JULY 1960 BY
INTERNATIONAL MAPPING CORPORATION
LOS ANGELES, CALIFORNIA

INDEX TO ADJOINING SHEETS

38-59	39-59	40-59
38-60	39-60	40-60
38-61	39-61	40-61

SCALE 1:2400
CONT. INTERVAL 5 FEET
U. S. G. S. DATUM

ONE THOUSAND FOOT CARNIA RECTANGULAR GRID (ZONE VI)
THE LAST THREE DIGIT THE GRID NUMBERS ARE OMITTED
THE RECTANGULAR COORDINATE ARE SHOWN ON THE SOUTH AND WEST MARGINS
THE GEOGRAPHIC VALUES SHOWN ON THE NORTH AND EAST MARGINS

254-1809	254-1815	254-1821
250-1809	250-1815	250-1821
246-1809	246-1815	246-1821

EXISTING DRAINAGE BASINS EXHIBIT

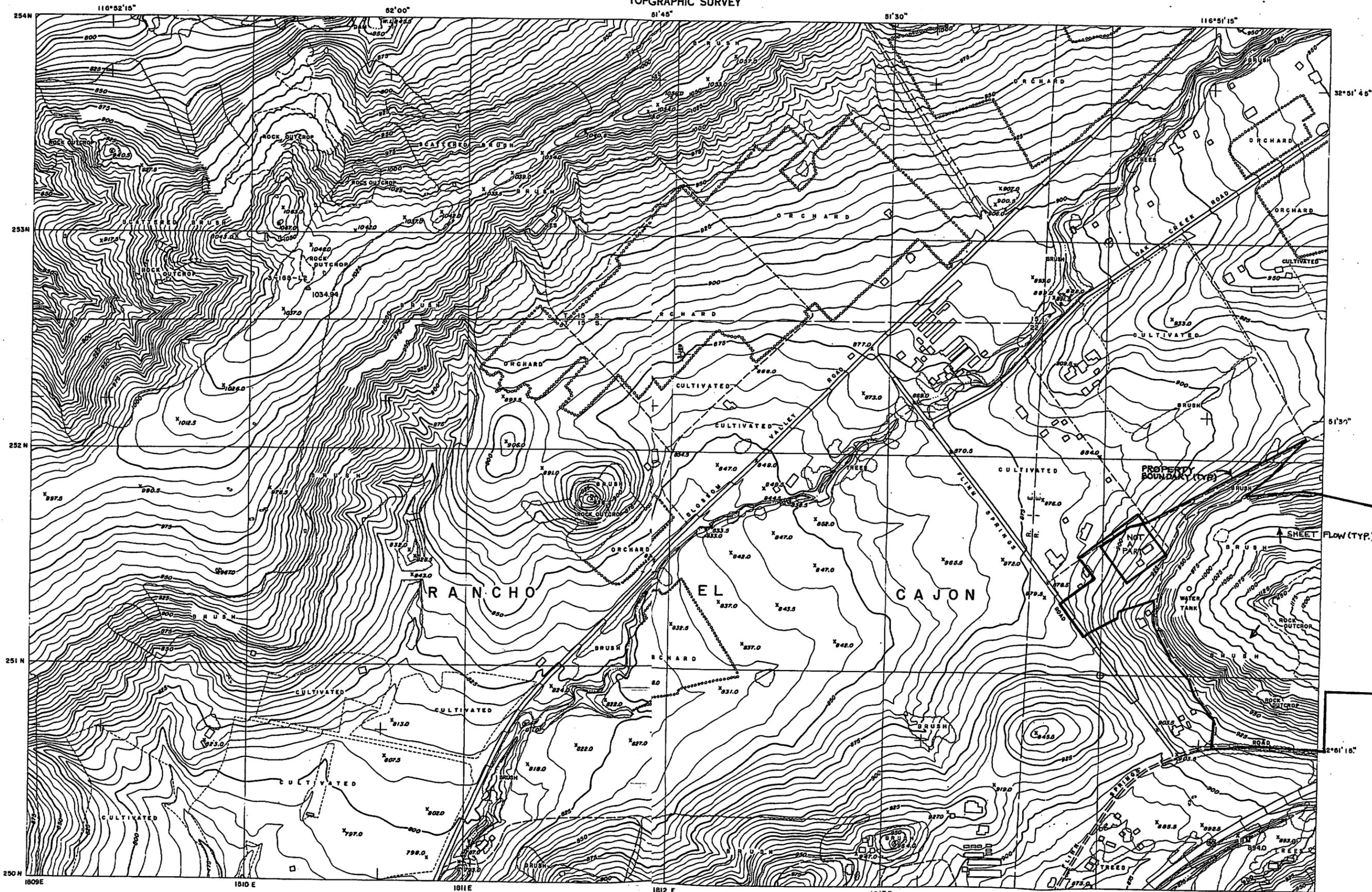
SAN DIEGO COUNTY CALIFORNIA

EDITION OF 1960

JN 450 12/15/04

DEC 17 2004
SHEET 39-60
250-1815

TOPOGRAPHIC SURVEY

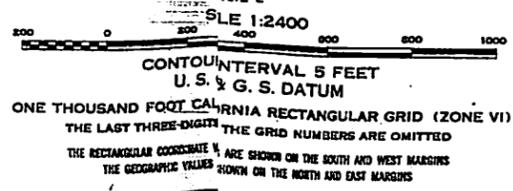


PREPARED UNDER THE DIRECTION OF THE COUNTY SURVEYOR OF THE COUNTY OF SAN DIEGO, CALIFORNIA. CONTROL BY U.S.C. & G.S., U.S.G.S. AND THE COUNTY OF SAN DIEGO. NORTH AMERICAN DATUM 1927.

COMPILED BY PHOTOGRAMMETRIC METHODS FROM PHOTOGRAPHY DATED JULY, 1960. INTERNATIONAL MAPPING CORPORATION LOS ANGELES, CALIFORNIA

INDEX TO ADJOINING SHEETS

38-59	39-59
38-60	39-60
38-61	39-61



254-1803	254-1809	254-1815
250-1803	250-1809	250-1815
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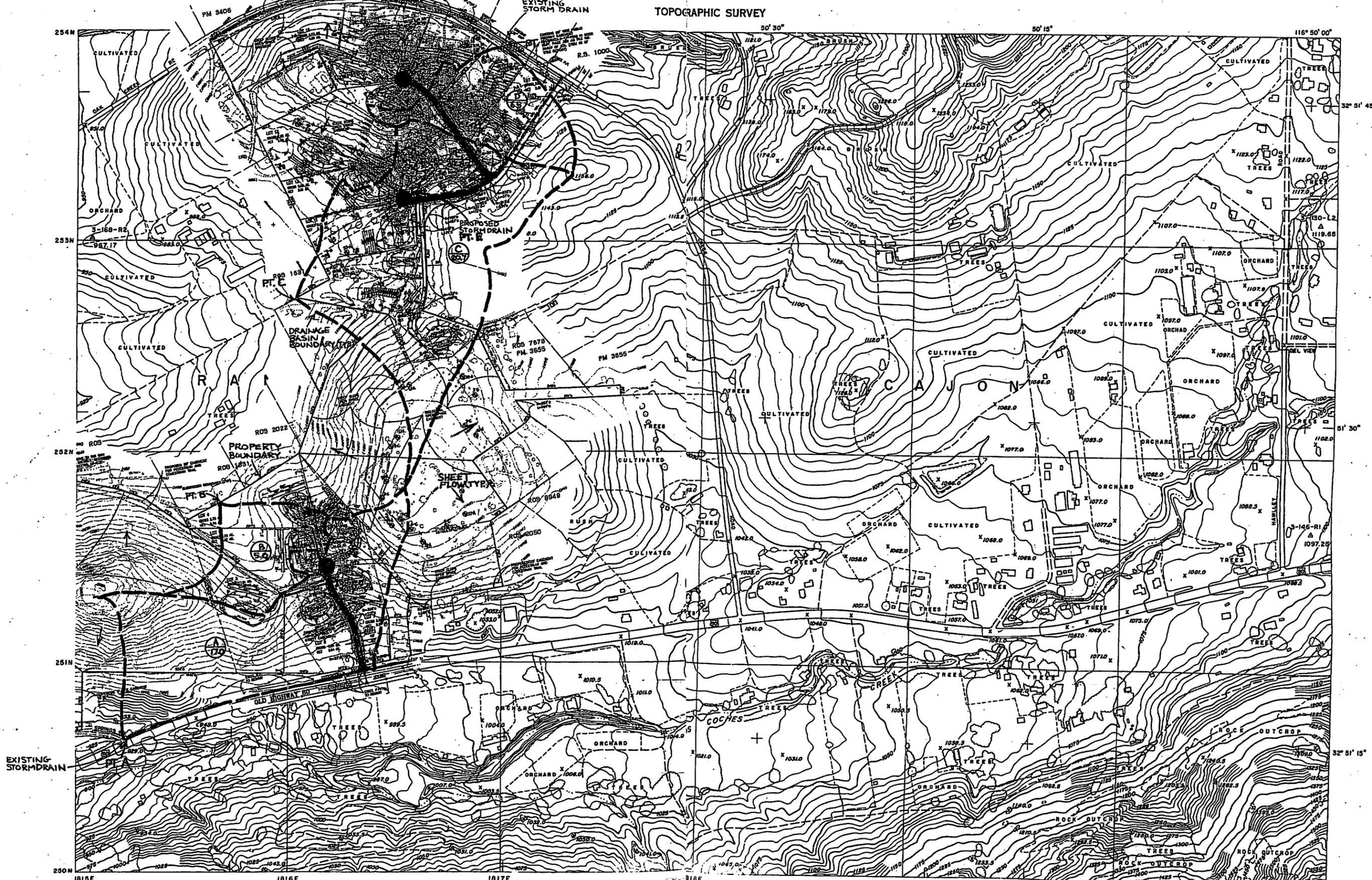
EXISTING DRAINAGE BASINS EXHIBIT
JN 450 12/15/04

SAN DIEGO COUNTY CALIFORNIA

EDITION OF 1960

DEC 17 2004
SHEET 38-60
250-1809

TOPOGRAPHIC SURVEY

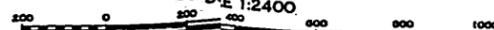


PREPARED UNDER THE DIRECTION OF THE COUNTY SURVEYOR OF THE COUNTY OF SAN DIEGO, CALIFORNIA. CONTROL BY U.S.C. & G.S., U.S.G.S. AND THE COUNTY OF SAN DIEGO. NORTH AMERICAN DATUM 1927.

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INDEX TO ADJOINING SHEETS

38-59	39-59	40-59
38-60	39-60	40-60
38-61	39-61	40-61



SCALE 1:2400
CONTOUR INTERVAL 5 FEET
U. S. G. S. DATUM
ONE THOUSAND FOOT CALIFORNIA RECTANGULAR GRID (ZONE VI)
THE LAST THREE DIGITS OF THE GRID NUMBERS ARE OMITTED
THE RECTANGULAR COORDINATE IS SHOWN ON THE SOUTH AND WEST MARGERS
THE GEOGRAPHIC VALUES ARE ON THE NORTH AND EAST MARGERS

254-1809	254-1815	254-1821
250-1809	250-1815	250-1821
246-1809	246-1815	246-1821

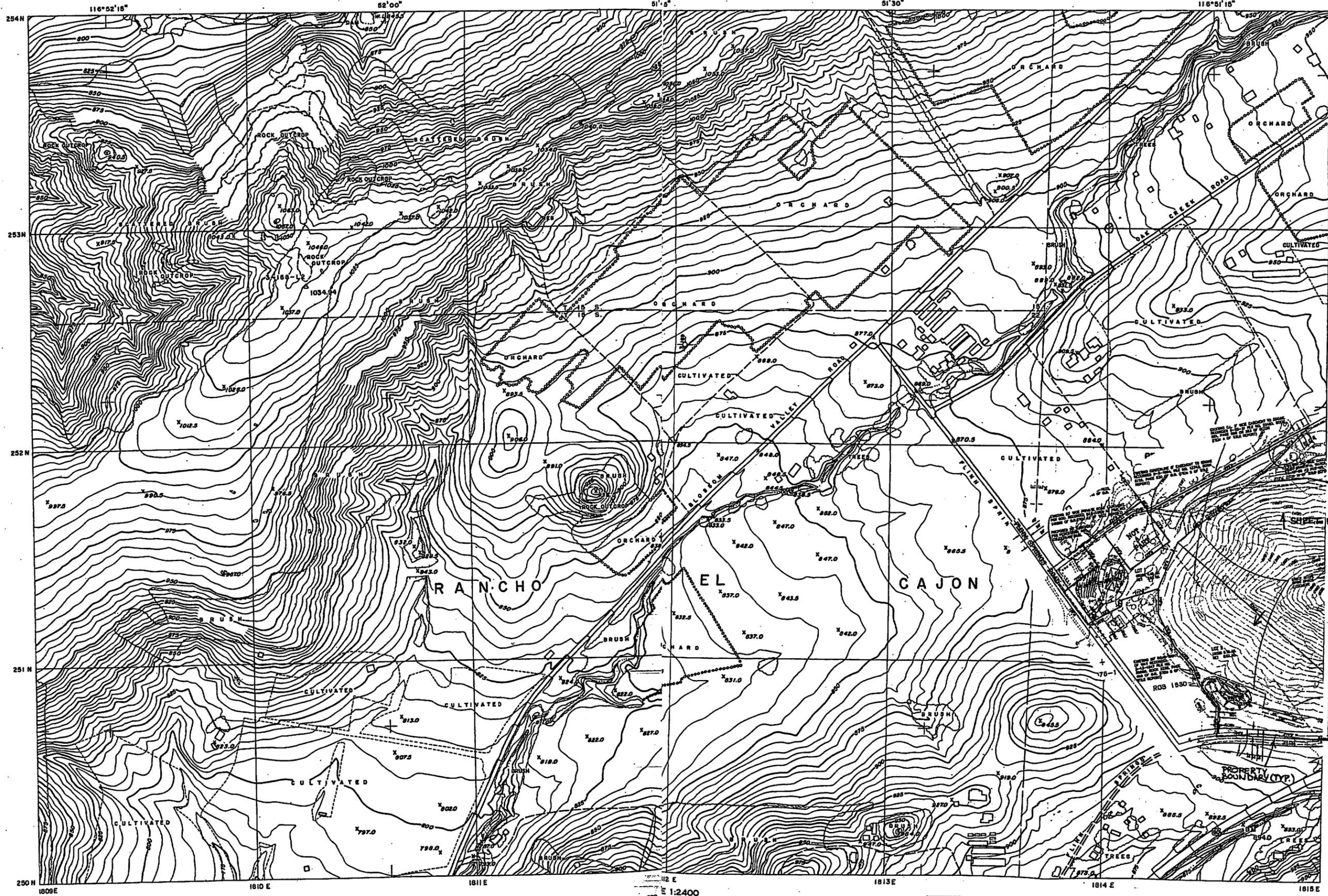
PROPOSED DRAINAGE BASINS EXHIBIT
JN 450 12/15/04

SAN DIEGO COUNTY CALIFORNIA
EDITION OF 1960

DEC 7 2004

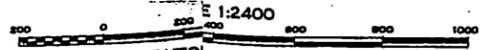
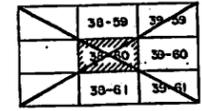
SHEET 39-60
250-1815
DEC 15 2004

COUNTY OF SAN DIEGO
TOPOGRAPHIC SURVEY



PREPARED UNDER THE DIRECTION OF THE COUNTY SURVEYOR OF THE COUNTY OF SAN DIEGO, CALIFORNIA, CONTROL BY U.S.C. & G.S., U.S.G.S. AND THE COUNTY OF SAN DIEGO, NORTH AMERICAN DATUM 1927.
COMPILED BY PHOTOGRAMMETRIC METHODS FROM PHOTOGRAPHY DATED JULY, 1960
INTERNATIONAL MAPPING CORPORATION
LOS ANGELES, CALIFORNIA

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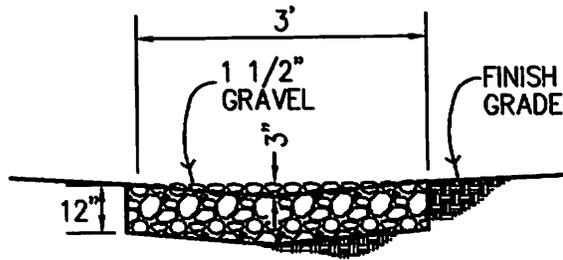


CONT. INTERVAL 5 FEET
U. S. G. S. DATUM
ONE THOUSAND FOOT U.S. RECTANGULAR GRID (ZONE VI)
THE LAST THREE DIGITS OF THE GRID NUMBERS ARE OMITTED
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PROPOSED DRAINAGE BASINS EXHIBIT
JN 450 12/15/04
SAN DIEGO COUNTY CALIFORNIA
EDITION OF 1960

DEC 17 2004
SHEET 38-60
250-1809
4029 T 330

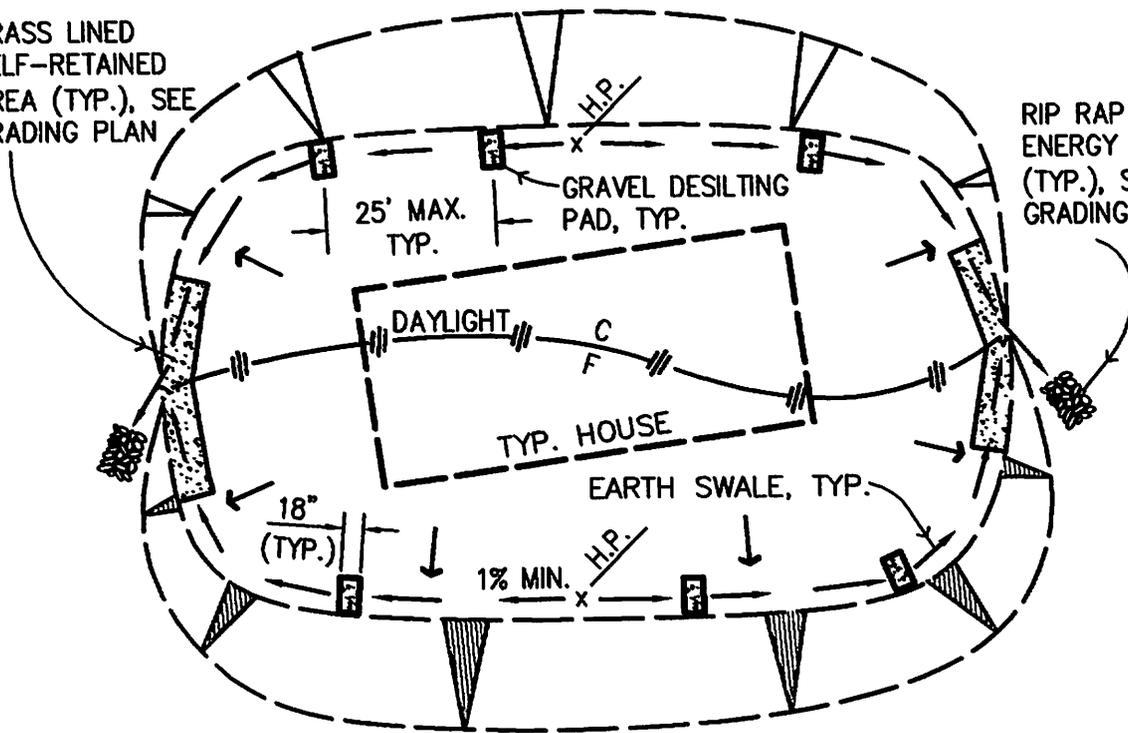


NOTE:
INSTALL GRAVEL
DESILTING PADS IN
EARTH SWALE AT
25' MAX. O.C.

DETAIL OF GRAVEL DESILTING PAD

GRASS LINED
SELF-RETAINED
AREA (TYP.), SEE
GRADING PLAN

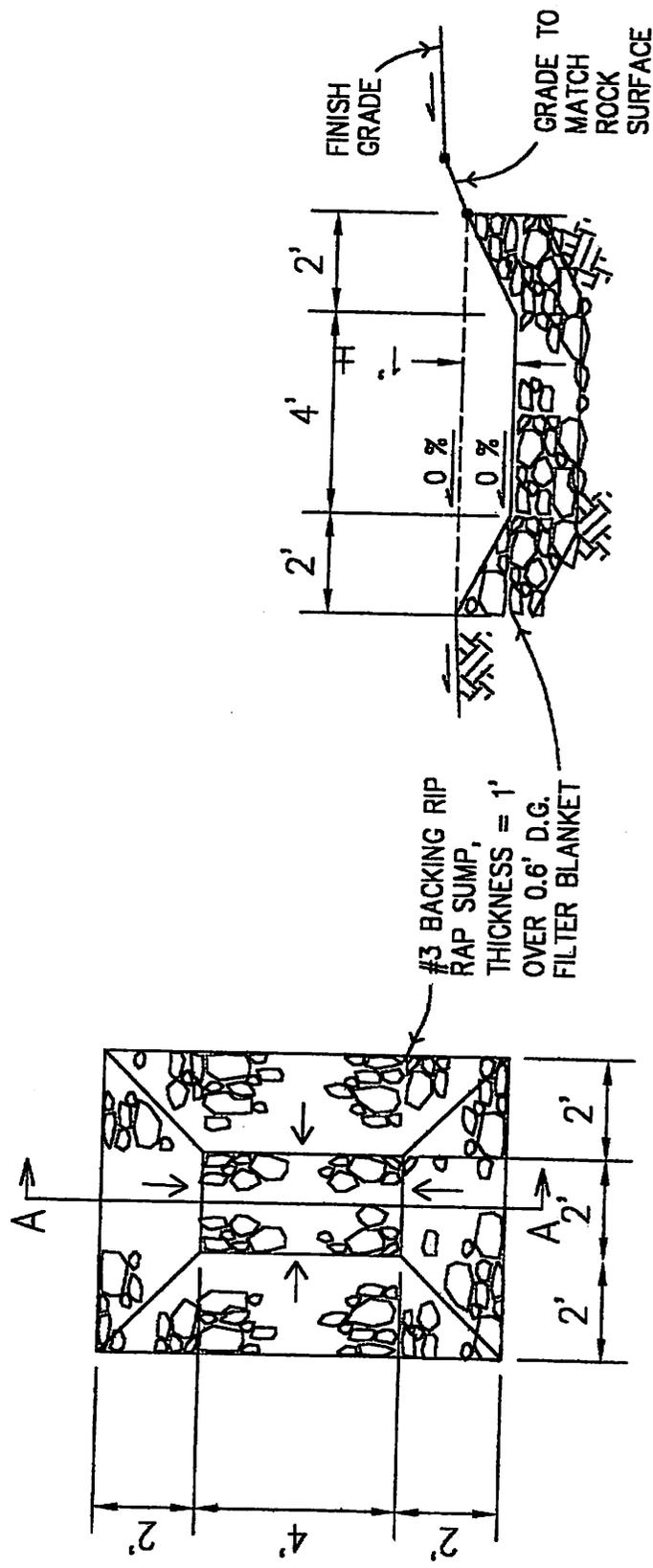
RIP RAP SUMP
ENERGY DISSIPATOR
(TYP.), SEE
GRADING PLAN



NOTE:
NO ROOF DRAIN PIPING OFF PAD. ALLOW WATER TO OVERLAND
FLOW FROM DOWNSPOUT/SPLASHBLOCK THROUGH YARD.

TYPICAL PAD DRAINAGE DETAIL

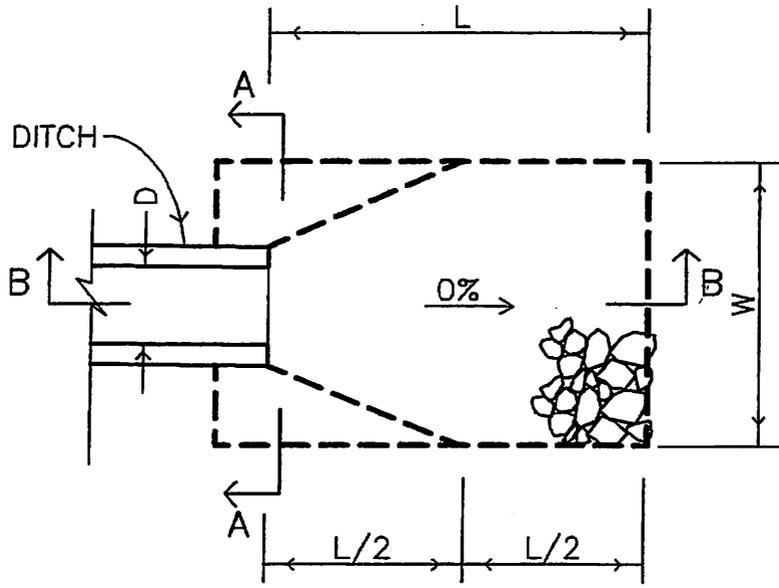
NO SCALE



SECTION A-A

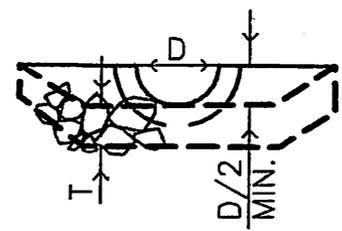
RIP RAP AT PAD OUTLET

PLAN



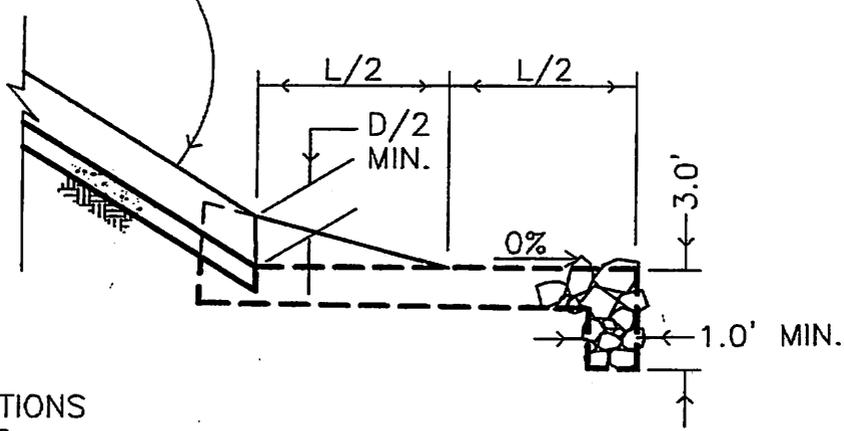
PLAN

D = 2' UNLESS NOTED OTHERWISE ON PLAN.



SECTION A-A

DITCH PER D-75



NOTE:
RIP RAP SPECIFICATIONS PER D-40

SECTION B-B

DETAIL I - RIPRAP ENERGY DISSIPATOR

NOT TO SCALE